CLAIMS

What is claimed is:

1. An ultrasound receiver for an electronic device, the receiver comprising:

a housing;

an ultrasonic transducer element disposed in the housing, the transducer element responsive to an impinging acoustic signal and producing an output electrical signal representing an acoustic waveform defined by the impinging acoustic signal; and

electronic circuitry for processing the output signal;

wherein the receiver is responsive to a cycle of the acoustic waveform defined by the impinging acoustic signal.

2. The receiver according to claim 1, wherein the impinging acoustic signal is transmitted from a remotely located ultrasound transmitter.

3. The receiver according to claim 2, wherein the electronic circuitry includes:

timing measuring circuitry for measuring the timing of the waveform represented by the output signal; and

trigger level detection circuitry for detecting the single cycle of the waveform represented by the output signal;

the timing measuring and trigger level detection circuitry determining a position of the transmitter.

4. The receiver according to claim 1, wherein the electronic circuitry includes timing measuring circuitry for measuring the timing of the waveform represented by the output signal.

5. The receiver according to claim 1, wherein the electronic circuitry includes trigger level detection circuitry for detecting the single cycle of the waveform represented by the output signal.

6. The receiver according to claim 1, wherein the housing has at least one surface which ensures mechanical stressing of the ultrasonic transducer element, in response to the impinging acoustic signal, in a manner which causes the transducer element to produce the output signal.

7. The receiver according to claim 6, wherein the at least one surface of the housing clamps opposing ends of the transducer element.

8. The receiver according to claim 7, wherein the transducer element is curved.

9. The receiver according to claim 8, where the housing includes a front cover having an acoustic aperture.

10. The receiver according to claim 9, wherein the transducer element is disposed below the acoustic aperture.

11. The receiver according to claim 10, wherein the acoustic aperture includes a grid disposed across the aperture.

12. The receiver according to claim 11, wherein the grid operates as an impedance matching element to enable an acoustic sensitivity of the receiver to be increased.

13. The receiver according to claim 10, wherein the grid operates to protect the transducer element from an external environment.

14. The receiver according to claim 10, wherein the acoustic aperture is formed in an outwardly curved member.

15. The receiver according to claim 14, wherein the transducer element curves toward the acoustic aperture.

16. The receiver according to claim 9, wherein the housing further includes a backplate, the opposing ends of the transducer element being clamped between the front cover and the backplate.

17. The receiver according to claim 16, further comprising a holder for holding electrical contact pins which provide electrical communication between the transducer element and the electronic circuitry.

18. The receiver according to claim 17, wherein the at least one surface of the housing includes clamping surfaces defined by the front cover and the backplate.

19. The receiver according to claim 18, wherein the clamping surfaces are complementarily curved.

20. The receiver according to claim 19, wherein curvature of the clamping surfaces are substantially identical to the curvature of the transducer element.

21. The receiver according to claim 20, wherein the clamping surfaces are formed by a first semi-cylindrical member defined by the front cover and a second semi-cylindrical member defined by the backplate.

22. The receiver according to claim 1, wherein the housing is a selected wall section of a housing of the electronic device.

23. The receiver according to claim 1, wherein the electronic device is portable.

24. The receiver according to claim 6, wherein the transducer element is bonded to the at least one surface of the housing.

25. The receiver according to claim 24, wherein the transducer element is curved.

26. The receiver according to claim 24, wherein the transducer element is substantially flat.

27. The receiver according to claim 24, wherein the at least one surface is a diaphragm capable of vibrating in response to the impinging acoustic signal.

28. The receiver according to claim 27, wherein the housing includes an exterior surface, the diaphragm being flush with the exterior surface of the housing.

29. The receiver according to claim 27, wherein the housing includes an exterior surface, the diaphragm being substantially flush with the exterior surface of the housing.

30. The receiver according to claim 27, wherein the housing includes exterior and interior surfaces, the diaphragm being recessed from one of the exterior and interior surfaces of the housing.

31. The receiver according to claim 27, wherein the housing includes an exterior surface, the diaphragm is orthogonal to the exterior surface of the housing.

32. The receiver according claim 27, wherein the housing includes transducer receiving cavity having a bottom wall, the diaphragm forming the bottom wall of the transducer receiving cavity.

33. The receiver according to claim 27, wherein the housing includes an acoustic aperture having a side wall, the diaphragm forming the side wall of the acoustic aperture.

34. The receiver according to claim 27, wherein the housing includes an acoustic aperture having a bottom wall, the diaphragm forming the bottom wall of the acoustic aperture.

35. The receiver according to claim 27, wherein the housing includes an acoustic aperture opening into a cavity having a bottom wall, the diaphragm forming the bottom wall of the cavity.

36. The receiver according to claim 27, wherein the transducer element is bonded to one of an exterior and interior surface of the diaphragm.

37. The receiver according to claim 1, wherein the transducer element comprises a film of piezoelectric material.

38. The receiver according to claim 37, wherein the piezoelectric material is selected from the group consisting of polyvinylidene fluoride and lead-zirconate-titanate.

39. The receiver according to claim 1, wherein the transducer element comprises an electrostatic transducer.

40. The receiver according to claim 1, wherein the transducer element is cylindrical.

41. An ultrasound transducer for an electronic device, the transducer comprising:

a housing; and

an ultrasonic transducer element associated with the housing, the transducer element capable of operating in at least one of a receiver mode and transmitter mode, in the receiver mode the transducer element producing an electrical signal in response to an impinging acoustic signal and in the transmitter mode the transducer element producing an acoustic signal in response to an electrical signal applied thereto;

wherein the housing has at least one surface which ensures mechanical stressing of the transducer element in a manner which causes the transducer element to produce the signals.

42. The transducer according to claim 41, wherein the at least one surface of the housing clamps opposing ends of the transducer element.

43. The transducer according to claim 42, wherein the transducer element is curved.

44. The transducer according to claim 43, where the housing includes a front cover having an acoustic aperture.

45. The transducer according to claim 44, wherein the transducer element is disposed below the acoustic aperture.

46. The transducer according to claim 45, wherein the acoustic aperture includes a grid disposed across the aperture.

47. The transducer according to claim 46, wherein the grid operates as an impedance matching element to enable an acoustic sensitivity of the transducer to be increased.

48. The transducer according to claim 45, wherein the grid operates to protect the transducer element from an external environment.

49. The transducer according to claim 45, wherein the acoustic aperture is formed in an outwardly curved member.

50. The transducer according to claim 49, wherein the transducer element curves toward the acoustic aperture.

51. The transducer according to claim 44, wherein the housing further includes a backplate, the opposing ends of the transducer element being clamped between the front cover and the backplate.

52. The transducer according to claim 51, further comprising a holder for holding electrical contact pins which provide electrical communication between the transducer element and the electronic circuitry.

53. The transducer according to claim 52, wherein the at least one surface of the housing includes clamping surfaces defined by the front cover and the backplate.

54. The transducer according to claim 53, wherein the clamping surfaces are complementarily curved.

55. The transducer according to claim 54, wherein curvature of the clamping surfaces are substantially identical to the curvature of the transducer element.

56. The transducer according to claim 55, wherein the clamping surfaces are formed by a first semi-cylindrical member defined by the front cover and a second semi-cylindrical member defined by the backplate.

57. The transducer according to claim 41, wherein the housing is a selected wall section of a housing of the electronic device.

58. The transducer according to claim 41, wherein the electronic device is portable.

59. The transducer according to claim 41, wherein the transducer element is bonded to the at least one surface of the housing.

60. The transducer according to claim 59, wherein the transducer element is curved.

61. The transducer according to claim 59, wherein the transducer element is substantially flat.

62. The transducer according to claim 59, wherein the at least one surface is a diaphragm capable of vibrating in response to the impinging acoustic signal.

63. The transducer according to claim 62, wherein the housing includes an exterior surface, the diaphragm being flush with the exterior surface of the housing.

64. The transducer according to claim 62, wherein the housing includes an exterior surface, the diaphragm being substantially flush with the exterior surface of the housing.

65. The transducer according to claim 62, wherein the housing includes exterior and interior surfaces, the diaphragm being recessed from one of the exterior and interior surfaces of the housing.

66. The transducer according to claim 62, wherein the housing includes an exterior surface, the diaphragm is orthogonal to the exterior surface of the housing.

67. The transducer according claim 62, wherein the housing includes transducer receiving cavity having a bottom wall, the diaphragm forming the bottom wall of the transducer receiving cavity.

68. The transducer according to claim 62, wherein the housing includes an acoustic aperture having a side wall, the diaphragm forming the side wall of the acoustic aperture.

69. The transducer according to claim 62, wherein the housing includes an acoustic aperture having a bottom wall, the diaphragm forming the bottom wall of the acoustic aperture.

70. The transducer according to claim 62, wherein the housing includes an acoustic aperture opening into a cavity having a bottom wall, the diaphragm forming the bottom wall of the cavity.

71. The transducer according to claim 62, wherein the transducer element is bonded to one of an exterior and interior surface of the diaphragm.

72. The transducer according to claim 41, wherein the transducer element comprises a film of piezoelectric material.

73. The transducer according to claim 72, wherein the piezoelectric material is selected from the group consisting of polyvinylidene fluoride and lead-zirconate-titanate.

74. The transducer according to claim 41, wherein the transducer element comprises an electrostatic transducer.

75. The transducer according to claim 41, wherein the transducer element is cylindrical.

76. The transducer according to claim 41, wherein the housing is separate from a housing of the electronic device.

77. The transducer according to claim 76, wherein the transducer is a modular unit insertable in an aperture of the housing of the electronic device.

78. The transducer according to claim 41, wherein the transducer element is curved.

79. The transducer according to claim 78, further comprising a backplate for clamping the transducer element to the housing.

80. The transducer according to claim 79, wherein the transducer element and backplate are disposed vertically relative to the housing.

81. The transducer according to claim 79, wherein the transducer element and backplate are disposed horizontally relative to the housing.

82. The transducer according to claim 81, wherein the housing includes an exterior surface having a recess formed therein which slopes toward the transducer element.

83. The receiver according to claim 1, wherein the transducer element is curved.

84. The receiver according to claim 83, further comprising a backplate for clamping the transducer element to the housing.

85. The receiver according to claim 84, wherein the transducer element and backplate are disposed vertically relative to the housing.

86. The receiver according to claim 84, wherein the transducer element and backplate are disposed horizontally relative to the housing.

87. The receiver according to claim 86, wherein the housing includes an exterior surface having a recess formed therein which slopes toward the transducer element.